

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of: Sosa, et al.

Serial No.: 10/674,224

Confirmation No.: 2510

Filed: September 29, 2003

For: High Impact Polystyrene and Process  
for Preparing Same

§ Atty. Dkt. No.: COS-857/864

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§ Group Art Unit: 1711

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§ Cust. No.: 25264

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§ Examiner: Asinovsky

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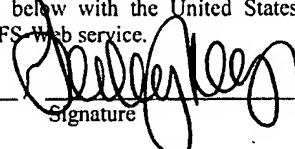
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Dear Honorable Commissioner:

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**APPEAL BRIEF**

Applicants submit this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decisions of the Examiner of Group Art Unit 1711 dated April 3, 2006, finally rejecting claims 1-9 and 12-27.

**Real Party in Interest**

The present application has been assigned to Fina Technology Inc., P.O. Box 674412, Houston, Texas 77267.

**Related Appeals and Interferences**

Appellants direct the Board's attention to U.S. Pat. Appl. Ser. No. 10/729,466, in which a Board of Patent Appeals & Interferences was rendered on January 26, 2007.

### **Status of Claims**

Claims 1-24 were originally filed in the application. Claims 25-26 were added in Response to an Office Action dated September 24, 2004. Claims 10-11 were cancelled and Claim 27 was added in Response to an Office Action dated March 31, 2005. Claims 1, 3-6, 8-9, 13-20, 22 and 24-27 stand rejected under 35 U.S.C. §102(b). Claims 1-2, 3-9, 12-15, 21-23, 25 and 27 stand rejected under 35 U.S.C. §103(a). The rejections of the pending claims are appealed.

The Examiner indicated that the subject matter of claim 10 “would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.” *See*, Final Office Action at page 6. Accordingly, Applicants submitted claim 10 in independent form including all of the limitations of the base claim (*i.e.*, claim 1) in response thereto. *See*, Response dated June 16, 2005, claim 27. However, the Examiner rejected such claim upon entrance of the amendment. *See*, Office Action dated April 3, 2006.

### **Status of Amendments**

No claim amendments were submitted in response to the Office Action dated April 3, 2006. The Final Office Action was withdrawn in response to the Appeal Brief filed on October 27, 2005.

### **Summary of Claimed Subject Matter**

High Impact Polystyrene (HIPS) processes generally include balancing properties, such as bulk viscosity, chemical grafting, rubber and polystyrene molecular weights and shear rates in order to prepare HIPS having a desired particle size and morphology. For example, it is generally considered desirable to formulate toward a narrow particle size distribution and large, regular inclusions in order to obtain the highest rubber phase volume. *See*, specification, at least page 8, paragraph 30 at lines 1 to 5. Unfortunately, as the level of grafting decreases, polystyrene inclusions can decrease in size, therefore increasing the overall number of particles per unit volume. *See*, specification, at least page 8, paragraph 31 at lines 3 to 5.

Therefore, embodiments of the present invention (recited in independent claim 1) provide a process of preparing HIPS, wherein a rubber and styrene monomer are admixed in the presence of at least two polymerization initiators and polymerized to form high impact polystyrene. In one embodiment (recited in independent claim 25) such initiators are selected to optimize a high impact polystyrene morphology. *See*, specification, at least page 6, paragraph 23 at lines 10 to 13, page 5, paragraph 21 at lines 1 to 3, page 5, paragraph 20 at lines 1 to 4 and page 8, paragraph 29, lines 1 to 9. The polymerization initiators include a grafting initiator and a non-grafting initiator. *See*, specification, at least page 6, paragraph 23 at lines 1 to 10 and page 6, paragraph 22 at lines 1 to 3. Such a process unexpectedly may increase the rubber particle size while maintaining the desired polymer morphology. *See*, specification, examples (*e.g.*, page 10, paragraph 37 at lines 7 to 11, Figure 3, numbers 301 and 302 and Figures 4-7 and Figures 8-9 for comparison.)

In one specific embodiment (recited in independent claim 27), at least one of the at least two polymerization initiators is a non-grafting initiator selected from the group consisting of 2,2'-azobis(isobutyronitrile), 2,2'-azobis(2-methylbutyronitrile), lauroyl peroxide, decanoyl peroxide, and mixtures thereof. *See*, specification, at least paragraph 22.

Dependent claim 26 recites that the morphology includes honeycomb structures. *See*, specification, at least page 8, paragraph 29 at lines 2 to 7. *See*, specification, at least paragraph 29.

### **Grounds of Rejection to be Reviewed on Appeal**

1. Whether the Examiner erred in rejecting claims 1, 3-6, 8-9, 13-15, 22, 25 and 27 under 35 U.S.C. §102(b) as being anticipated by, or in the alternative under 35 U.S.C. §103(a) as being unpatentable over, U.S. Patent No. 4,125,695 (*Kamath*).
2. Whether the Examiner erred in rejecting claims 1, 3-5, 8-9, 13-20 and 24-27 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,861,827 (*Sosa '827*).

3. Whether the Examiner erred in rejecting claims 2, 6-7, 12 and 21-23 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,861,827 (*Sosa* '827) in view of U.S. Patent No. 5,428,106 (*Schrader*.)

### Arguments

**I. THE EXAMINER ERRED IN REJECTING CLAIMS OVER *KAMATH* BECAUSE THE BROAD DISCLOSURE IN *KAMATH* DOES NOT TEACH ADMIXING A RUBBER AND STYRENE MONOMER IN THE PRESENCE OF A GRAFTING INITIATOR AND A NON-GRAFTING INITIATOR.**

The Examiner stated that *Kamath* discloses a process for the free radical polymerization of vinyl monomers including styrene monomer containing dissolved elastomers for producing high impact polystyrene in the presence of an initiator system containing at least two initiators. *See*, Office Action dated April 3, 2006 at page 4. The Examiner further stated that one type of initiator is a peroxy-containing initiator and another type of initiator is azo-bis-isobutyronitrile. *See, Id.* The Examiner specifically recites the initiators of example 5 (benzoyl peroxide and R-S604) and Example 7 (R-A76, LUPERSOL 331 and R-233) for support that *Kamath* is teaching grafting initiators in combination with non-grafting initiators.

While Appellants agree that *Kamath* teaches a two initiator system, Appellants disagree that *Kamath* teaches or suggests polymerizing styrene monomer in the presence of a grafting initiator and a non-grafting initiator, as recited in the pending claims. In particular, the examples of *Kamath* do not teach the use of a grafting initiator and a non-grafting initiator. In fact, example 5 teaches the use of two non-grafting initiators, while example 7 teaches the combination of grafting initiators.

It is well established that to anticipate a claim, a single source must contain all of the elements of the claim. *See, Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1379, 231 U.S.P.Q. 81, 90 (Fed. Cir. 1986.) As stated previously, there is no teaching or suggestion in *Kamath* to use a grafting initiator in combination with a non-grafting initiator. The reference must "sufficiently describe the claimed invention to have placed the public in possession of it." *See, Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopedics, Inc.*, 976 F.2d 1559, 1572, 24 U.S.P.Q.2d 1321,1332 (Fed. Cir.

1992.) Further, the reference must “clearly and unequivocally disclose the claimed compound or direct those skilled in the art to the compound without any need for picking, choosing and combining various disclosures.” See, *In re Arkley*, 455 F.2d 586, 587, 172 U.S.P.Q. 524, 526 (C.C.P.A. 1972.) The reference must therefore provide a certain degree of precision with respect to the specific compound claimed. *Kamath* does not clearly and unequivocally disclose the features of the pending claims.

Accordingly, Appellants respectfully request reversal of the rejection.

**II. THE EXAMINER ERRED IN REJECTING CLAIMS 1, 3-5, 8-9, 13-20 AND 24-27 UNDER 35 U.S.C. §102(b) AS BEING ANTICIPATED BY *SOSA* '827 BECAUSE THE BROAD DISCLOSURE IN *SOSA* '827 DOES NOT TEACH ADMIXING A RUBBER AND STYRENE MONOMER IN THE PRESENCE OF A GRAFTING INITIATOR AND A NON-GRAFTING INITIATOR.**

The Final Rejection stated that because “any addition components in a process for producing a HIPS composition is/are expected as conventional ingredients”, “any morphology structure of the resultant HIPS polymer could be obtained” in *Sosa* '827. See, Final Rejection at page 4. It is well established that to anticipate a claim, a single source must contain all of the elements of the claim. See, *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1379, 231 U.S.P.Q. 81, 90 (Fed. Cir. 1986.) Further, to support an anticipation rejection based on inherency, an Examiner must provide factual and technical grounds establishing that the inherent feature necessarily flows from the teachings of the prior art. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. See, *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Int. 1990.)

Applicants disagree that *Sosa* anticipates the pending claims. *Sosa* teaches that “peroxy free-radical initiators are a useful class of initiators for such processes, but that acidic decomposition by-products of such peroxy free-radical initiators produce the undesirable effects which the present invention is intended to alleviate. Applicants’ recognition of such acidic by-products as the source of a problem in the manufacture of HIPS products is a significant threshold aspect of the present invention.” See, at least

column 4, lines 25-35. While *Sosa* states that "alternatively, a combination of two or more free radical initiators could be used, such that one free radical initiator decomposes in the polymerization reactor and another free radical initiator decomposes in the linear-flow reactor," *Sosa* nowhere teaches or suggests combining a grafting initiator and a non-grafting initiator, such initiators selected to optimize a high impact polystyrene morphology, as recited in pending claim 25. See, at least column 3, lines 55-61. Rather, *Sosa* teaches selecting initiators that do not produce acidic by-products.

Therefore, reversal of the rejection is respectfully requested.

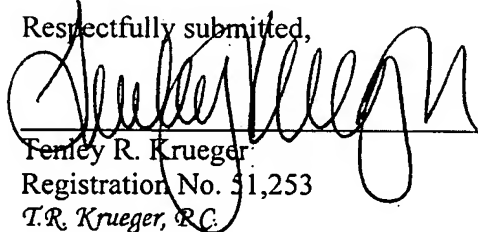
**III. THE EXAMINER ERRED IN REJECTING CLAIMS 2, 6-7, 12 AND 21-23 UNDER 35 U.S.C. §103(a) AS BEING UNPATENTABLE OVER *SOSA* '827 IN VIEW OF *SCHRADER*.**

*Sosa* does not teach or suggest the features of the pending claims. Appellants submit that *Schrader* does not supply the features missing in *Sosa*. Accordingly, Appellants assert that a detailed discussion of *Schrader* is not necessary. Therefore, Appellants respectfully request reversal of the rejection.

**Conclusion**

In conclusion, the references of record do not teach or suggest the subject matter of the pending claims. Thus, Appellants respectfully request reversal of the rejections of claims 1-9 and 12-27.

Respectfully submitted,



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**Appendix A**  
*Pending Claims*

1. A process for preparing a high impact polystyrene comprising admixing a rubber and styrene monomer in the presence of at least two polymerization initiators and polymerizing the styrene wherein at least one of the at least two polymerization initiators is a grafting initiator and at least one of the at least two polymerization initiators is a non-grafting initiator.
2. The process of Claim 1 additionally comprising polymerizing the styrene monomer in the presence of a chain transfer agent.
3. The process of Claim 1 wherein rubber is selected from the group consisting of polybutadiene, styrene-butadiene rubber, styrene-butadiene-styrene rubber, natural rubber, and mixtures thereof.
4. The process of Claim 3 wherein the rubber is polybutadiene.
5. The process of Claim 1 additionally comprising including a solvent in the admixture.
6. The process of Claim 5 wherein the solvent is selected from the group consisting of ethylbenzene, toluene, xylenes, cyclohexane, and mixtures thereof.
7. The process of Claim 5 wherein the solvent is an aliphatic hydrocarbon solvent.
8. The process of Claim 1 wherein the grafting initiator is selected from the group consisting of 1,1-di-(t-butylperoxy)cyclohexane; 1,1-di-(t-amylperoxy)cyclohexane; 1,1-di-(t-butylperoxy)-3,3,5-trimethyl-cyclohexane; OO-t-amyl-O-(2-ethylhexyl monoperoxy-carbonate); OO-t-butyl O-isopropyl monoperoxy-carbonate; OO-t-butyl-O-(2-ethylhexyl)monoperoxy-carbonate; butyl-4,4-di(t-butylperoxy)valerate; Ethyl 3,3-Di-(t-butylperoxy)butyrate; and mixtures thereof.

9. The process of Claim 8 wherein the grafting initiator is 1,1-di-(t-butylperoxy)cyclohexane.
12. The process of Claim 1 wherein the high impact polystyrene is prepared using an upflow reactor.
13. The process of Claim 12 wherein the process is a continuous process.
14. The process of Claim 1 wherein the temperatures range for the polymerization is from about 100°C to about 230°C.
15. The process of Claim 14 wherein the temperatures range for the polymerization is from about 110°C to about 180°C.
16. The process of Claim 1 wherein the grafting initiator is present in an amount of from about 50 to about 1000 parts per million and the non-grafting initiator is present in an amount of from about 100 to about 600 parts per million.
17. The process of Claim 16 wherein the grafting initiator is present in an amount of from about 100 to about 600 parts per million and the non-grafting initiator is present in an amount of from about 100 to about 500 parts per million.
18. The process of Claim 1 wherein the grafting and non-grafting initiators are present in a ratio of grafting to non-grafting initiator of from about 1:10 to about 10:1.
19. The process of Claim 18 wherein the ratio of grafting to non-grafting initiator is from about 1:3 to about 3:1.
20. The process of Claim 19 wherein the weight ratio of styrene to rubber is from about 99:1 to about 7:1.



21. The process of Claim 1 wherein the admixture includes an additive.
22. The process of Claim 21 wherein the additive is selected from the group consisting of chain transfer agents, talc, anti-oxidants, UV stabilizers, lubricants, mineral oil, plasticizers
23. The process of Claim 1 additionally comprising removing residual monomer or solvent from the product high impact polystyrene.
24. A high impact polystyrene prepared by the process of Claim 1.
25. A process for preparing a high impact polystyrene comprising:  
admixing a rubber and styrene monomer in the presence of at least two polymerization initiators selected to optimize a high impact polystyrene morphology, wherein at least one of the at least two polymerization initiators is a grafting initiator and at least one of the at least two polymerization initiators is a non-grafting initiator; and  
polymerizing the styrene to form the high impact polystyrene.
26. The process of claim 25, wherein the high impact polystyrene morphology comprises honeycomb structures.
27. A process for preparing a high impact polystyrene comprising admixing a rubber and styrene monomer in the presence of at least two polymerization initiators and polymerizing the styrene wherein at least one of the at least two polymerization initiators is a grafting initiator and at least one of the at least two polymerization initiators is a non-grafting initiator selected from the group consisting of 2,2'-azobis(isobutyronitrile), 2,2'-azobis(2-methylbutyronitrile), lauroyl peroxide, decanoyl peroxide, and mixtures thereof.

## Appendix B

### *Evidence*

1. *Ex parte Levy*, 17 U.S.P.Q.2d 1461 (Bd. Pat. App. & Int. 1990.)
2. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q. 81 (Fed. Cir. 1986.).
3. *Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopedics, Inc.*, 976 F.2d 1559, 24 U.S.P.Q.2d 1321 (Fed. Cir. 1992.)
4. *In re Arkley*, 455 F.2d 586, 172 U.S.P.Q. 524 (C.C.P.A. 1972.)

## **Appendix C**

### *Related Proceedings Appendix*

1. Board Decision in U.S. Pat. Appl. Ser. No. 10/729,446.